Histogram, error bars and function fitting in idl

The aim of this exercise it to write simple programmes in idl, and find and use idl resources to perform tasks in idl. This homework is assessed, and counts for half of the idl tutorial assessment marks. Provide your results on a google document (include the programmes, and their output), deadline for submission is November 12th.

Tasks:

1. write an idl *batch-script* that generates a set of data points, θ_i, $i = 1, N$ with $N = 10^3$, Gaussian distributed with mean $\langle\theta\rangle = 8$ and dispersion $\sigma_\theta = 42$. Write the points to an ascii file, an hdf5 file, and save them using the idl save command. [2 marks]

2. Write a simple idl programme that restores the values saved using the save command, and compute the mean and dispersion. Compare with the values returned from the built-in idl function. [2 marks]

3. write an idl *programme* that reads-in the ascii file data, and compute and plot a histogram of the data points. Store the idl plot as a png file. [2 marks]

4. Do the same reading the hdf5 file, but plot the number of points per bin using filled circles, with error bars denoting the bin-width (horizontal error bar), and the variance of points per bin (vertical error bars, assume Poisson statistics). Store the idl plot as a png file. [2 marks]

5. Generate a similar histogram but now with $N = 100$. Plot the histograms (normalised to unity) for the $N = 10^2$ and $N = 10^3$ case as above, using blue (red) filled circles for $N = 10^3$ ($N = 10^2$). Superpose a legend. [2 marks]

6. Use your the data from your $N = 10^3$ histogram. Use idl to fit a Gaussian, and determine the best-fit parameters for mean and dispersion. Over plot the Gaussian fit on your histogram. Superpose a legend. Save as png. [6 marks]

7. Save the previous idl plot in postscript and print it. Write the axes labels as θ, and $\mathcal{P}(\theta)$. [4 marks]

Make sure you upload all plots, the programmes your write, and a link to idl resources that you used, onto your google document. Then allow me access to the document.